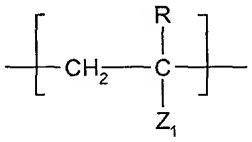
Claims:

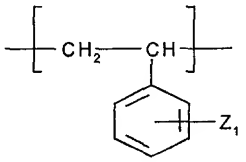
1. A process for coating a material surface comprising the steps of:
(a) applying to the material surface one or more different comb-type polymers comprising a polymer backbone and side chains pendently attached thereto, wherein at least a part of the side chains carry a triggerable precursor for carbene or nitrene formation; and
(b) fixing the polymer(s) onto the material surface using heat or radiation, in particular radiation such as UV or visible light.

2. A process according to claim 1, wherein the polymer backbone according to step (a) of the process comprises a polyvinyl homo- or copolymer, a polyethylene imine, a polypeptide, a polyether or a polysaccharide, and the side chains that are attached to the polymer backbone are selected from the group consisting of functional hydrophilic telomers, polyalkylene oxides, oligosaccharides and oligopeptides.

3. A process according to claim 1 or 2, wherein the comb-type polymer according to step (a) of the process is
(I) a polyvinyl polymer comprising units of the formula

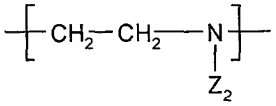


(1a), or



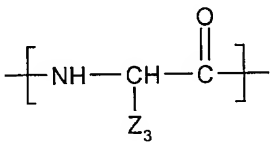
(1b),

wherein R is hydrogen or C_1-C_4-alkyl and Z_1 is a hydrophilic side chain comprising at least one one triggerable precursor for carbene or nitrene formation and having a weight average molecular weight of ≥ 200; or
(II) a polyethylene imine comprising units of formula



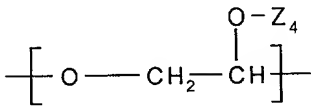
(1c),

wherein Z_2 is a hydrophilic side chain comprising at least one triggerable precursor for carbene or nitrene formation and having a weight average molecular weight of ≥ 200; or (III) a polypeptide comprising units of formula



(1d),

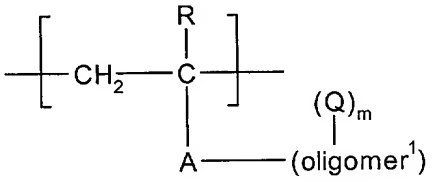
wherein Z_3 is a hydrophilic side chain comprising at least one triggerable precursor for carbene or nitrene formation and having a weight average molecular weight of ≥ 200; or (IV) a polyether comprising units of formula



(1e),

wherein Z_4 is a hydrophilic side chain comprising at least one triggerable precursor for carbene or nitrene formation and having a weight average molecular weight of ≥ 200, or (V) a polysaccharide comprising saccharide units to which is attached a side chain Z_5 comprising at least one triggerable precursor for carbene or nitrene formation and having a weight average molecular weight of ≥ 200.

4. A process according to any one of claims 1 to 3, wherein the comb-type polymer according to step (a) comprises units of formula



(1),

wherein R is hydrogen or C_1-C_4-alkyl;

A is a radical of formula

- C(O) – X - (2a),
- C(O) – O – $(CH_2)_r$ – CH(OH) - CH_2 – X - (2b),
- C(O) – NH – (alk') – C(O) – X - (2c),
- C(O) – O – (alk") – NH – C(O) – X - (2d),
- C(O) – X – (alk") - X_1 – C(O) - (2e),
- C(O) – NH – C(O) – X - (2f),
- $(alk"')_s$ – X – D - X_1 - (2g)
- X – (alk') - X_1 - (2h),

- X – C(O) - (2i),

- (alk''') – C(O) – X - (2j) or

- (alk''') – X - C(O) - (2k),

wherein (alk') is C_1-C_6-alkylene; (alk'') is C_2-C_{12}-alkylene; (alk''') is C_1-C_6-alkylene; D is a group -C(O)- or –C(S)- and s is 0 or 1;

X and X_1 are each independently a group –O- or –NR_1-, wherein R_1 is hydrogen or C_1-C_4-alkyl;

(oligomer^1) is the radical of

(i) a hydrophilic telomer which is derived from one or more different copolymerizable vinyl monomers,

(ii) the radical of an oligosaccharide;

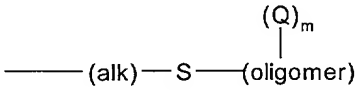
(iii) the radical of an oligopeptide; or

(iv) the radical of a polyalkylene oxide;

Q is a radical comprising a triggerable precursor for carbene or nitrene formation;

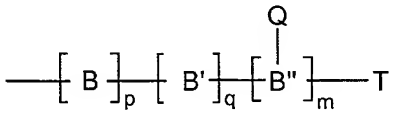
r is an integer from 1 to 4; and m is an integer ≥ 1.

5. A process according to claim 4, wherein the radical -(oligomer^1)-$(Q)_m$ corresponds to a radical of formula



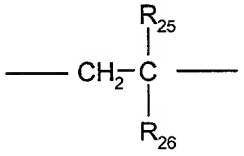
(3),

wherein (alk) is C_2-C_6-alkylene and (oligomer)-$(Q)_m$ corresponds to formula

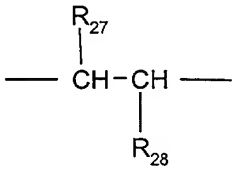


(3a),

wherein B and B' are each independently of the other a radical of formula



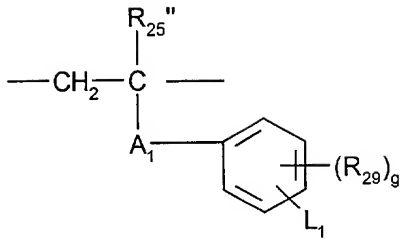
(4a)



(4b),

wherein R_{25} is hydrogen or C_1-C_4-alkyl, R_{26} is a hydrophilic substituent; R_{27} is C_1-C_4-alkyl, phenyl or a radical -C(O)OY_9, wherein Y_9 is hydrogen or unsubstituted or hydroxy-substituted C_1-C_4-alkyl; and R_{28} is a radical -C(O)OY_9' or -CH_2-C(O)OY_9' wherein Y_9' independently has the meaning of Y_9;

B"-Q is a 1,2-ethylene radical of formula



(4c),

wherein R_{25}'' is hydrogen or C_1-C_4-alkyl,

A_1 is a linking member of formula

- C(O) - X' - (6a),

- $(CH_2)_t$ - X' – C(O) - (6b),

- C(O) - X' – (Alk) - X_2 – C(O) - (6c),

- $(CH_2)_t$ - X' – D_1 – NH - (6d),

- C(O) – X' – (Alk) - X_2 – A_2 – NH - (6e), or

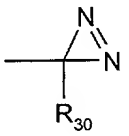
- $(CH_2)_t$ – X' – CH_2 – CH(OH) - CH_2 - (6f),

X' and X_2 are each independently a group –O- or –NR_1'-, R_1' is hydrogen or C_1-C_4-alkyl; D_1 is a group –C(O)- or –C(S)-, (Alk) is C_2-C_{12}-alkylene, t is 0 or 1,

R_{29} is C_1-C_4-alkyl, C_1-C_4-alkoxy, amino, hydroxy, sulfo, nitro, trifluoromethyl or halogen,

g is an integer from 0 to 2,

L_1 is a group of formula

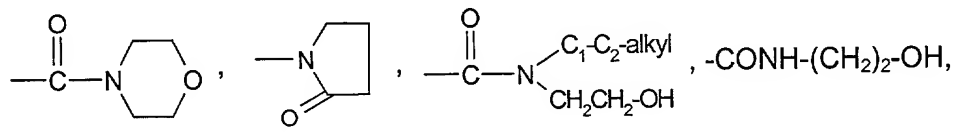
 (7a), or -N_3 (7b),

R_{30} is fluorinated C_1-C_6-alkyl,

p and q are each independently of another an integer from 0 to 250, wherein the total of (p+q) is an integer from 2 to 250, m is an integer from 1 to 3, and

T is a monovalent group that is suitable to act as a polymerization chain-reaction terminator.

6. A process according to claim 5, wherein B and B' are each independently a radical of formula (4a), R_{25} is hydrogen or methyl, and R_{26} is a radical -$CONH_2$, -$CON(CH_3)_2$,

 , -CONH-$(CH_2)_2$-OH,

-$COO(CH_2)_{2-4}$-NHC(O)-O-G, wherein -O-G is the radical of trehalose, -COOH, -NH_2, -CH_2-NH_2, -CH_2-$N(CH_3)_2$, –C(O)NH-$(CH_2)_{2-3}$-NH_2, -C(O)O-$(CH_2)_{2-3}$-NH_2,

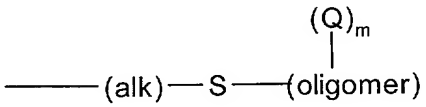
-COO-$(CH_2)_2$-$N(CH_3)_2$ or -C(O)O-CH_2-CH(OH)-CH_2-$N(CH_3)_3^+An^-$, wherein An^- is an anion.

7. A process according to any one of claims 4 to 6, wherein in the polymer units of formula (1) R is hydrogen or methyl, A is a radical of formula

$$- C(O) - X - \quad (2a),$$

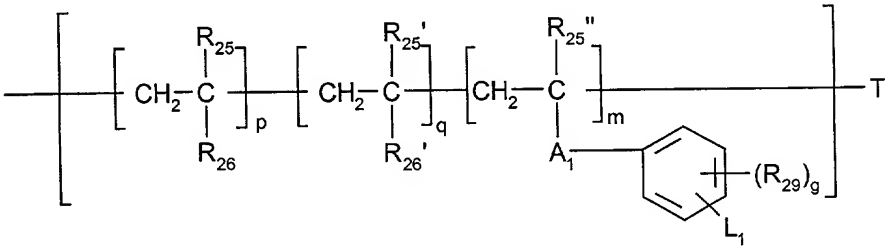
$$- C(O) - O - (alk'') - NH - C(O) - X - \quad (2d),$$

(alk") is C_2-C_4-alkylene; X is –NH-; and (oligomer^1)-$(Q)_m$ is a telomer radical of formula

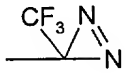


(3),

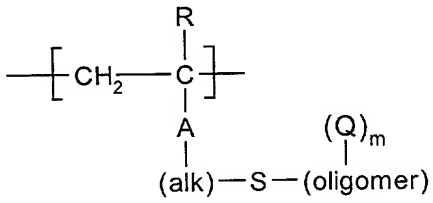
wherein (alk) is C_2-C_4-alkylene and (oligomer)-$(Q)_m$ corresponds to formula



(3b),

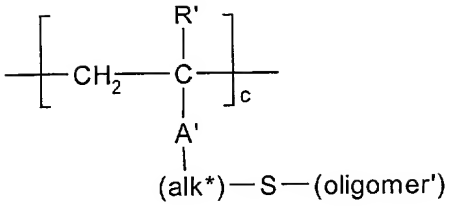
wherein R_{25}, R_{25}' and R_{25}" are each independently hydrogen or methyl, R_{26} is a radical -$CONH_2$, -$CON(CH_3)_2$ or N-pyrrolidonyl, R_{26}' is -NH_2 or –C(O)X'-(Alk)-NH_2, X' is –O- or –NH-, (Alk) is C_2-C_3-alkylene, A_1 is a radical –NH-C(O)- or –C(O)-NH-$(CH_2)_{2-4}$-NH-C(O)-, g is 0, L_1 is a radical  or -N_3, p and q are each independently an integer from 0 to 150, wherein the total of (p+q) is an integer from 2 to 150, m is an integer from 1 to 3, and T is a monovalent group that is suitable to act as a polymerization chain-reaction terminator.

8. A process according to any one of claims 1 to 7, wherein the comb-type polymer according to step (a) is a polymer comprising units of formula

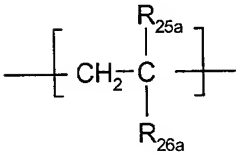


(1a'),

and optionally

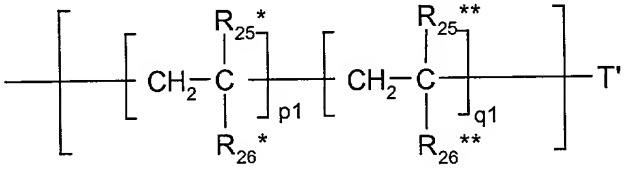


(9a') or



(4a'),

wherein R, R' and R_{25a} are each independently hydrogen or methyl, R_{26a} is a radical $-CONH_2$, $-CON(CH_3)_2$ or N-pyrrolidonyl, A and A' are each independently a radical of the above formula (2a), (2c), (2d), (2i) or (2k) given in claim 4, wherein X is a group -O- or -NH-, (alk)'' is C_2-C_4-alkylene, (alk') is a radical $-CH_2-$ or $-C(CH_3)_2-$, and (alk''') is C_1-C_2-alkylene, (alk) and (alk*) are each independently C_2-C_4-alkylene, (oligomer)-$(Q)_m$ is a radical of formula (3b) according to claim 7, and (oligomer') is a radical of formula



(3d'),

wherein R_{25}* and R_{25}** are each independently hydrogen or methyl, R_{26}* and R_{26}** are each independently a radical $-CONH_2$, $-CON(CH_3)_2$ or N-pyrrolidonyl, p1 and q1 are each independently an integer of from 0 to 150 and the total of (p1+q1) is an integer from 2 to 150, and T' is a monovalent group that is suitable to act as a polymerization chain-reaction terminator.

9. A process according to claim 8, wherein the comb-type polymer according to step (a) essentially consists of units of formula (1a').

10. A process according to claim 8, wherein the comb-type polymer according to step (a) essentially consists of units of formula (1a') and optionally (9a').

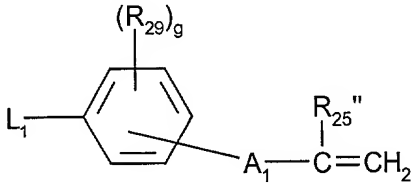
11. A process according to any one of claims 1 to 10, wherein the material surface to be coated is the surface of a biomedical device, particularly a contact lens, intraocular lens or artificial cornea.

12. A composite material comprising
(i) an inorganic or organic bulk material; and
(ii) a hydrophilic surface coating obtainable by the process according to any one of claims 1 to 11.

13. Use of a comb-type polymer comprising a polymer backbone and side chains pendently attached thereto, wherein at least a part of the side chains carry a triggerable precursor for carbene or nitrene formation for the modification of a material surface, in particular of a surface of a biomedical article.

14. A polymer comprising units of formula (1a), (1b), (1c) or (1d) according to claim 3.

15. A compound of formula



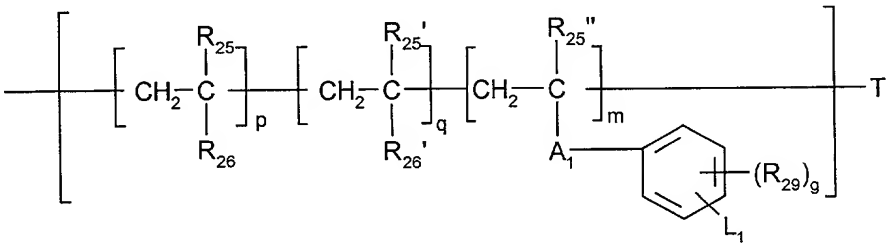
(14),

wherein A_1, L_1, R_{25}", R_{29} and g are each as defined in claim 5.

16. A telomer of formula

$$A_4 - (alk) - S - (oligomer)-[Q]_m \qquad (13),$$

wherein A_4 is hydroxy, amino, carboxy or a derivative thereof, (alk) is C_2-C_6-alkylene, and (oligomer)-$[Q]_m$ is a radical of formula



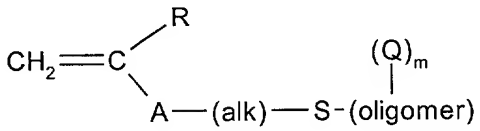
(3b),

wherein R_{25}, R_{25}' and R_{25}" are each independently hydrogen or C_1-C_4-alkyl, R_{26} and R_{26}' are each independently a hydrophilic substituent,

p and q are each independently of another an integer from 0 to 250, wherein the total of (p+q) is an integer from 2 to 250, m is an integer ≥ 1,

T is a monovalent group that is suitable to act as a polymerization chain-reaction terminator, and R_{25}", R_{29}, A_1, L_1 and g are each as defined in claim 5.

17. A macromonomer of formula



(10a),

wherein R is hydrogen or C_1-C_4-alkyl, (alk) is C_2-C_6-alkylene, A is a radical of formula (2a) – (2k) given in claim 4, and (oligomer)-$(Q)_m$ is a radical of formula (3b) given in claim 16.

18. A biomedical article, particularly a contact lens, intraocular lens or artificial cornea, comprising a surface coating that is obtainable by fixing a polymer according to claim 14 onto its surface by the action of heat or radiation.